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(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC,
SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

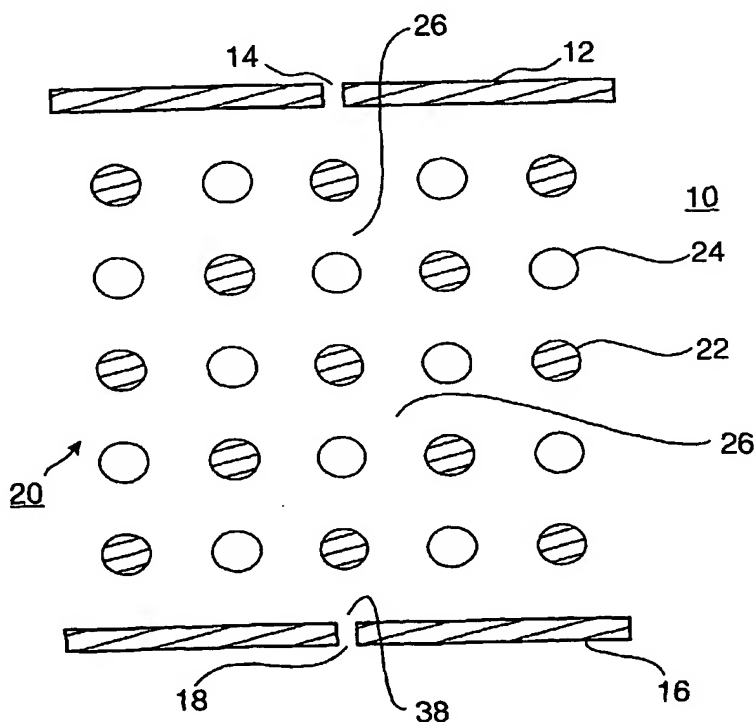
(84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted
a patent (Rule 4.17(ii)) for the following designations AE,
AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA,
CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES,
FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH,

[Continued on next page]

(54) Title: **HIGH FIELD ASYMMETRIC WAVEFORM ION MOBILITY SPECTROMETER (FAIMS)**



(57) Abstract: An apparatus for separating ions including a plurality of first electrode rods having a first length. The apparatus also includes a plurality of second electrode rods arranged in an alternating sequence with the plurality of first electrode rods, each second electrode rod of the plurality of second electrode rods having a second length a space between the electrode rod and adjacent second electrode rod defining an analytical gap for separating ions. At least an electrical controller is provided for electrically coupling to at least one of the plurality of first electrode rods and the plurality of second electrode rods, for applying an asymmetric waveform voltage between the at least one of the plurality of first electrode rods and the plurality of second electrode rods and for applying a direct current voltage between the at least one of the plurality of first electrode rods and the plurality of second electrode rods so as to establish an electric field within the portion of the analytical gap. During use, ions propagating along a direction that is transverse to both the first length and the second length are separated in the portion of the analytical gap between first electrode rod and the adjacent second electrode rod.



PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD,

RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— of inventorship (Rule 4.17(iv)) for US only

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:

17 June 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No.

PC/CA 03/01350

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01N27/64

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 01 69647 A (GUEVREMONT ROGER ; NAT RES COUNCIL CANADA (CA)) 20 September 2001 (2001-09-20) page 15-16; figure 4 ---	1,11
A	US 6 124 592 A (SPANGLER GLENN E) 26 September 2000 (2000-09-26) column 1-6; figures 1-8 ---	1,11
A	WO 01 69216 A (PURVES RANDY ; GUEVREMONT ROGER (CA); NAT RES COUNCIL CANADA (CA)) 20 September 2001 (2001-09-20) abstract; figures 1-5,11 page 32, line 9 -page 33, line 10 --- -/--	1,11



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

1 April 2004

Date of mailing of the international search report

22/04/2004

Name and mailing address of the ISA

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Klein, M-0

INTERNATIONAL SEARCH REPORT

International Application No

P/A 03/01350

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>GUEVREMONT R ET AL: "Atmospheric pressure ion trapping in a tandem FAIMS-FAIMS coupled to a TOFMS: studies with electrospray generated gramicidin S ions" JOURNAL OF THE AMERICAN SOCIETY FOR MASS SPECTROMETRY, ELSEVIER SCIENCE INC., NEW YORK, NY, US, vol. 12, no. 12, December 2001 (2001-12), pages 1320-1330, XP004329084 ISSN: 1044-0305 the whole document</p> <p>-----</p>	1,11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 03/01350

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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			WO 0169217 A2	20-09-2001
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			WO 0169217 A2	20-09-2001
			WO 0169646 A2	20-09-2001
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			WO 0169219 A2	20-09-2001
			WO 0169220 A2	20-09-2001
			WO 0169647 A2	20-09-2001
			WO 0169221 A2	20-09-2001

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 03/01350

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0169216	A	CA 2401722 A1	20-09-2001
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		US 2003089849 A1	15-05-2003
		US 2003057367 A1	27-03-2003
		US 2003150985 A1	14-08-2003
		US 2003038235 A1	27-02-2003

Box No. VIII (iv) DECLARATION: INVENTORSHIP *(only for the purposes of the designation of the United States of America)*

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII(i) to (v) (in general) and the specific Notes to Box No. VIII(iv). If this Box is not used, this sheet should not be included in the request.

**Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv))
for the purposes of the designation of the United States of America:**

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/
Rule 26ter).

(if furnishing declaration pursuant to

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the world Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications:

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name: GUEVREMONT, ROGER

Residence: OTTAWA, ONTARIO, CANADA
(city and either US state, if applicable, or country)

Mailing Address: 2059 GATINEAU VIEW CRESCENT, OTTAWA, ONTARIO, K1J 7W9, CANADA

Citizenship: CANADIAN

Inventor's Signature:

(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date:

(of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

Name:

Residence:

(city and either US state, if applicable, or country)

Mailing Address:

Citizenship:

Inventor's Signature:

(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date:

(of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)



This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".